

Application No. 10/580,165  
Reply to Office Action of March 7, 2009

### REMARKS

The non-final Office Action dated May 6, 2009, has been carefully reviewed and the following remarks are responsive thereto. Claims 1 and 7 have been amended. No new matter has been added. Claims 1-26 remain pending upon entry of the present amendment. Reconsideration and allowance are respectfully requested.

#### *Claim Rejection – 35 USC § 103*

Claims 1-11, 19-25 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hoppenstein (US 2004/0204109 A1) in view of Frank et al. (US 2004/0127174 A1). This rejection is respectfully traversed for at least the following reasons.

#### Claim 1:

Claim 1 has been amended by adding “in the base band system” after “when transmitting forward signals, different beams are made to have different time delays” in claim 1. From the fifth paragraph under the Detailed Description of Embodiments, it can be seen that no new matter is added.

By the present amendment, the amended claim 1 recites a device for realizing beam-forming in CDMA system:

said device comprising in a forward signal flow, at least a base band system, an optical transceiver system, a transceiver system, an analog fixed beam-forming network, a power amplifier, a transmission filter at a radio frequency front end, and an antenna system;

said device comprising in a reverse signal flow, at least the antenna system, a reception filter at a radio frequency front end, a low noise amplifier, the analog fixed beam-forming network,

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the transceiver system, the optical transceiver system and the base band system;  
the optical transceiver system comprising an optical fiber and an optical interface board close to the base band system and an optical interface board close to the transceiver system, and enabling the base band system be placed in a warehouse so as to make the base band system support more sectors, and a radio frequency part close to the antenna, thereby reducing power loss;

said optical interface board being used to interconvert electronic signals and optical signals input□

when transmitting forward signals, different beams are made to have different time delays in the base band system so that they are not coherent with one another even when different beams carry same information.

Neither Hoppenstein nor Frank, either separately or in combination, teaches or suggests such features.

Firstly, claim 1 is distinguishable from Hoppenstein. For example, claim 1 recites that “when transmitting forward signals, different beams are made to have different time delays in the base band system so that they are not coherent with one another even when different beams carry same information”. The Office Action concedes that Hoppenstein lacks a teaching or suggestion of such a feature. Instead, the Office Action relies on Frank. However, the applicant respectfully submits that Frank does not teach or suggest this feature. Although [0006] of Frank discloses “a plurality of offset circuits to offset the signal in either time or frequency”, Frank does **not** teach or suggest that when transmitting forward signals, different beams are made to have different time delays in the base band system so that they are not coherent with one another even when different beams carry same information. Referring to Frank, it **neither** recites a *base band* system **nor** *base band* signals. What is further, referring

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to lines 1-4 of paragraph [0025] of Frank, there is a recitation of “As illustrated in FIG. 4, an antenna system 40 has four line feeds 41-44. The signal on these line feeds 41-44 are each modified by a corresponding time delay circuitry 45-48 prior to being fed into beam source 49”, and in particular when referring to figures 7-10 of Frank, it can be seen that the signal, which is modified by a corresponding time delay circuitry prior to being fed into beam source, is an *analog signal, but not base band signal*. That is to say, Frank does **not** make different beams to have different time delays *in a base band system*, instead, Frank makes different signals have different time delays in an *analog system*. Further, Frank fails to teach or suggest when transmitting forward signals, different beams are made to have different time delays. Accordingly, claim 1 is allowable for at least these reasons.

Additionally, claim 1 recites that the device for realizing beam-forming in CDMA system comprises an analog fixed beam-forming network. That is to say, in claim 1, the device for realizing beam-forming in CDMA system comprises a fixed beam-forming network which uses an analog beam-forming technique. However, Hoppenstein does not teach or suggest such a feature. The applicant respectfully submits that tower top 22 described by Hoppenstein is **not** an analog fixed beam-forming network, since it **neither** discloses the tower top 22 is a *fixed beam-forming network*, **nor** discloses the tower top 22 uses an *analog beam-forming technique*. Frank fails to cure these deficiencies of Hoppenstein. Accordingly, claim 1 is allowable for this additional reason.

Claim 1 further recites that the device for realizing beam-forming in CDMA system comprises a base band system. However, Hoppenstein does not disclose this feature. The applicant respectfully submits that base station control unit 38 described by Hoppenstein is **not** a baseband system. Although in paragraph [0024] of Hoppenstein, it recites “digital baseband”, Hoppenstein, however, does **not** disclose that the base station control unit 38 is a

base band system which is used for modulating and demodulating signals. Actually, to those having ordinary skill in the art, it is known that the base station control unit, which is generally called BSC for short, is a unit for controlling the base station, but **not** for modulating and demodulating signals. Frank fails to cure these deficiencies of Hoppenstein as well. Accordingly, claim 1 is allowable for this additional reason.

Still further, claim 1 recites that the device for realizing beam-forming in CDMA system comprises a reception filter at a radio frequency front end and a reception filter at a radio frequency front end. The applicant respectfully submits that Hoppenstein does not disclose this feature. The element 70 disclosed by Hoppenstein is an **antenna array** and is not equivalent to the reception filter at a radio frequency front end recited by claim 1. Accordingly, claim 1 is allowable for at least this additional reason.

The above distinguishing technical features are not well known in the art.

Thus it has been shown to be non-obvious to one of ordinary skill in the art at the time of the invention was made to modify Hoppenstein by using the teachings of Frank.

Therefore, the amended claim 1 has been non-obvious at the time the invention was made and in condition for allowance.

**Claims 2-4:**

Claims 2-4 are dependent on claim 1, and are thus allowable for at least the same reasons as the amended claim 1.

**Claims 5:**

Claim 5 depends on claim 1, and further defines "said analog fixed beam-forming network

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may be Butler matrix, or Blass matrix, or electromagnetic lens of the Lunegberg or Rotman type”.

Hoppenstein does not disclose this additional feature. Furthermore, although Frank recites “Butler Matrices”, it **neither** discloses *Blass matrix* or *electromagnetic lens of the Lunegberg or Rotman type*, **nor** discloses *analog fixed beam-forming network*. Therefore Frank does **not** disclose that “said analog fixed beam-forming network may be Butler matrix, or Blass matrix, or electromagnetic lens of the Lunegberg or Rotman type”. Thus neither Hoppenstein nor Frank, either separately or in combination, teaches or suggests the additional feature of claim 5.

The above distinguishing features are not well known in the art.

Thus it has been non-obvious to one of ordinary skill in the art at the time of the invention was made to modify Hoppenstein by using the teachings of Frank.

Additionally, claim 5 is dependent on claim 1. As stated above, neither Hoppenstein nor Frank, either separately or in combination, teaches or suggests the device defined in the amended claim 1, so claim 5 which depends on claim 1, is allowable for at least the same reasons as the amended claim 1.

**Claim 6:**

Claim 6 is dependent on claim 1, and is thus allowable for at least the same reasons as the amended claim 1.

**Claim 7:**

The applicant respectfully replaces the term “optical interface module” in claim 7 with

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“optical transceiver system” to keep the term identical and avoid any unclearness that might be caused. No new matter is added.

Now claim 7 recites a device for realizing beam-forming in CDMA system,  
said device comprising in a forward signal flow at least a base band system, a digital fixed beam-forming network, an optical transceiver system, a transceiver system, a power amplifier, a transmission filter of radio frequency front end and an antenna system;

said device comprising in a reverse signal flow at least the antenna system, a reception filter of radio frequency front end, a low noise amplifier, the transceiver system, the optical transceiver system, the digital fixed beam-forming network, and the base band system;

said optical transceiver system comprising an optical fiber, an optical interface board close to the base band system and an optical interface board close to the transceiver system, and enabling the base band system be placed in a warehouse so as to make the base band system support more sectors, and a radio frequency part close to the antenna, thereby reducing the power loss;

said optical interface board being used to interconvert electronic signals and optical signals input;

when transmitting forward signals, different beams are made to have different time delays in the base band system so that they do not correlate with one another even when the different beams carry same information.

Neither Hoppenstein nor Frank, either separately or in combination, teaches or suggests such features.

Firstly, claim 7 is distinguishable from Hoppenstein. For example, claim 7 recites the device for realizing beam-forming in CDMA system comprises a digital fixed beam-forming network. That is to say, in claim 7, the device for realizing beam-forming in CDMA system

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comprises a fixed beam-forming network which uses a digital beam-forming technique. The applicant respectfully submits that tower top 22 described by Hoppenstein is **not** a digital fixed beam-forming network, since it **neither** discloses the tower top 22 is a *fixed beam-forming network*, **nor** discloses the tower top 22 uses a *digital beam-forming technique*. Further, the Office Action asserts that the tower top 22 in Hoppenstein is the analog fixed beam-forming network in claim 1 of the present invention; however, the Office Action asserts the tower top 22 in Hoppenstein also is the digital fixed beam-forming network in claim 7 of the present invention. The applicant respectfully submits that what the Office Action asserts regarding claim 1 **conflicts** with what is asserted regarding claim 7, since a digital fixed beam-forming network is an absolutely different beam-forming network from analog fixed beam-forming network, and if the element 22 is an analog fixed beam-forming network as asserted in the Office Action, it is impossible that the same element 22 is a digital fixed beam-forming network as well. Accordingly, claim 7 is allowable for at least these reasons.

Additionally, based on the similar reasons as discussed in claim 1, the applicant respectfully submits that claim 7 has been non-obvious at the time the invention was made and in condition for allowance. For example, as stated above in claim 1, neither Hoppenstein nor Frank, either separately or in combination, teaches or suggests “when transmitting forward signals, different beams are made to have different time delays in the base band system so that they do not correlate with one another even when the different beams carry same information”.

The above distinguishing features are not well known in the art.

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Thus it has been non-obvious to one of ordinary skill in the art at the time of the invention was made to modify Hoppenstein by using the teachings of Frank.

Therefore, claim 7 was non-obvious at the time the invention was made and in condition for allowance.

**Claims 8-11 and 23-25:**

Claims 8-11 and 23-25 depend on claim 7 directly or indirectly, and are thus allowable for at least the same reasons as claim 7.

***Claim Rejection – 35 USC § 102***

Claims 12-18 and 26 stand rejected under 35 U.S.C. 102(e) as being anticipated by Frank. This rejection is respectfully traversed for at least the following reasons.

**Claim 12:**

Claim 12 recited a method for realizing beam-forming in CDMA system, at least comprising the following steps of:

step one: in a base band, reflecting base band signals of each fixed beam to sectors of base band chips;

step two: making the base band signals of the fixed beams reflected to corresponding sectors of the base band chips have different time delays.

Firstly, what claim 12 defines is a method for realizing beam-forming in CDMA system. However, what Frank discloses is a method for minimizing overlap nulling in switched beams. No method for *realizing beam-forming* can be found in Frank.

Further, the applicant respectfully submits that Frank fails to disclose or even suggest the element “step one: in a base band, *reflecting* base band signals of each fixed beam to sectors



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of base band chips". The step one defined in claim 12 of the present invention can particularly be applied in CDMA system, since people in the art often utilize chips that have been existed at present in CDMA system, for example, the base band chips of Qualcomm Company are often utilized. By implementing the step one defined in claim 12 of the present invention (that is, by implementing "in a base band, *reflecting* base band signals of each fixed beam to sectors of base band chips"), the method defined in claim 12 of the present invention can utilize the base band chip that has been existed at the present to realize beam-forming in CDMA system, without changing the hardware structure of base band chip that has been existed at present.

The element of "step two: making the base band signals of the fixed beams reflected to corresponding sectors of the base band chips have different time delays" cannot be found in Frank as well. As stated above in claim 1, Frank does **not** make the *base band* signals of the fixed beams have different time delays; instead, Frank makes *analog* signals have different time delays.

Accordingly, the applicant respectfully submits that no element in claim 12 of the present invention can be found in Frank and thus claim 12 is allowable.

**Claims 13-18 and 26:**

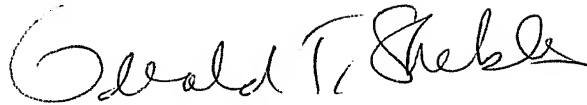
Claims 13-18 and 26 depend on claim 12 directly or indirectly, and are thus allowable for at least the same reasons as claim 12.

**Conclusion**

The Applicants believe they have responded to each matter raised by the Examiner. Allowance of the claims is respectfully solicited. It is believed that the present patent application, after the above amendments and statement of opinions, has overcome all the defects pointed out by the Examiner and is in conformity with the relevant provisions, so it should be granted patent rights. The Applicants expect early granting of patent right for this application. If there is still a problem that the Examiner believes is not overcome by the above amendments and statement of opinions, please give the Applicants another chance to make amendments and further clarification or explanation or observation.

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Respectfully submitted,

A handwritten signature in black ink, appearing to read "Gerald T. Shekleton". The signature is fluid and cursive, with the first name "Gerald" being more prominent than the last name "Shekleton".

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